DEVELOPMENT OF RECOMMENDATIONS AND GUIDELINES FOR PAVEMENT REHABILITATION DESIGN PROCEDURES FOR THE STATE OF IDAHO

PHASE 2: Development of a Mechanistic-Based Overlay Design System

ITD Project Number RP 121, Agreement No. 95-60
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Volume II
FLEXOLAY Program User Manual

Submitted to:

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Installation and Operation of

FLEXOLAY 1.2

An Overlay Design Program for Flexible Pavements

1. System Requirements

As with any program, there are some specific hardware that are needed to run the overlay design program. The following is the minimum recommended hardware :

- MS-DOS operating system version 3.0 or later.
- Personal computer using 8088 or higher microprocessor.
- Machine with 1 MB of memory or greater.
- 1 MB free hard-disk space.
- Math co-processor.
- VGA, EGA, Hercules, or other compatible color monitor.
- Mouse or compatible pointing device (recommended).

2. Program Installation

To Install FLEXOLAY in the hard disk, follow the following steps:

- Create a directory in the hard disk and name it C:\FLEXOLAY. At the DOS prompt, type: C:\>md FLEXOLAY and enter.
- Place the distribution diskette of the FLEXOLAY program in the floppy diskette drive (e.g. Drive A).
- Copy all files from drive A to the created directory. From A:> Prompt type A:>COPY *.* C:\FLEXOLAY and enter.

- Now the C:\FLEXOLAY sub-directory contains all files on the FLEXOLAY distribution diskette. Make sure that the following three files exist in the sub-directory:
  FLEXOLAY.EXE, SYSAN.EXE, and DOSXMSF.EXE

3. Starting The Program

After the installation of the program is completed, type FLEXOLAY at the directory which contains the copied program files,(i.e.,C:\FLEXOLAY> FLEXOLAY). This will start the program and display the introduction screen. Move the mouse or press ENTER to clear the introduction. The screen will show a menu bar and a title bar as shown in Fig. 1.

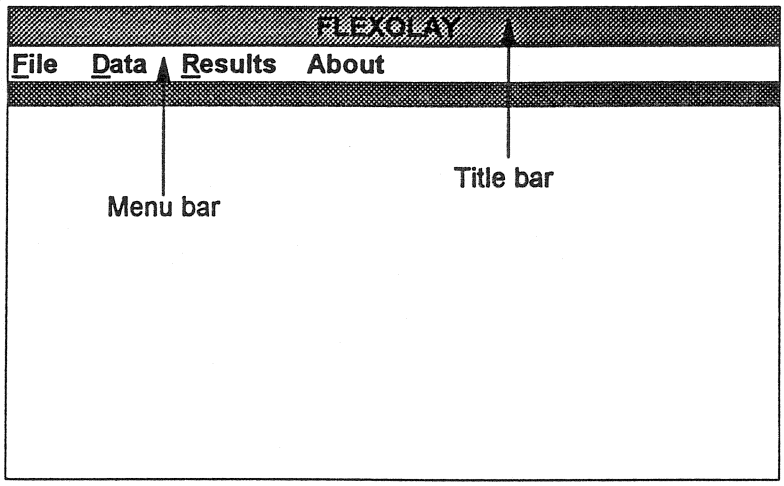


Figure 1 Overlay program menu bar.

After this step, the program is ready to take the commands. The menu bar contains File command menu, Data command menu , Results command menu and the About command. Each command menu contains related commands as shown in Fig. 2 through Fig. 4. There are two ways to select a command with the mouse :

- clicking on the menu name and dragging the mouse down while keeping the mouse button pressed. When the command of interest is highlighted, releasing the button will run the command.

- Clicking once on the menu name. The menu will remain open. Moving the pointer to the command of interest and clicking the mouse will run the command.

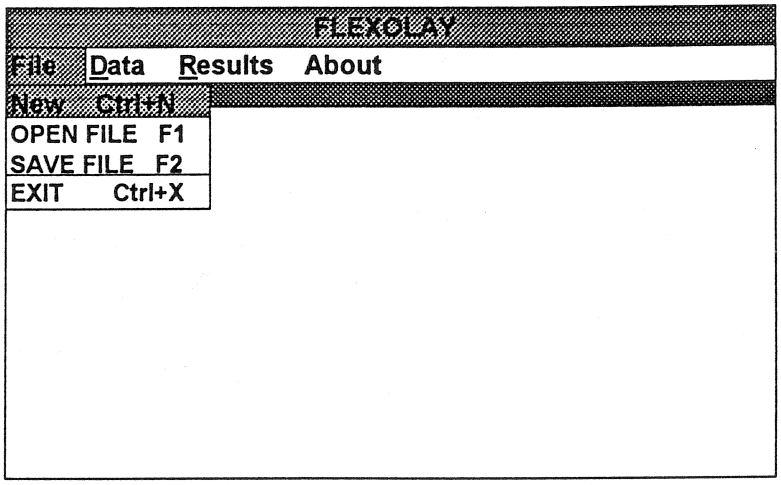


Figure 2 File command menu.

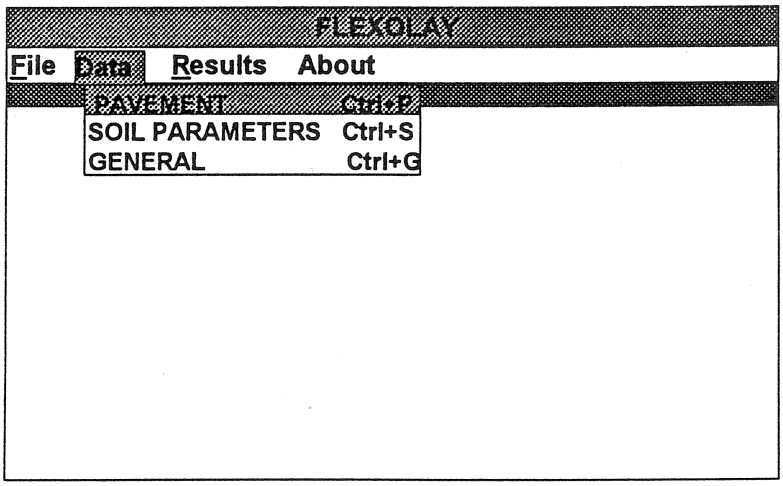


Figure 3 Data command menu

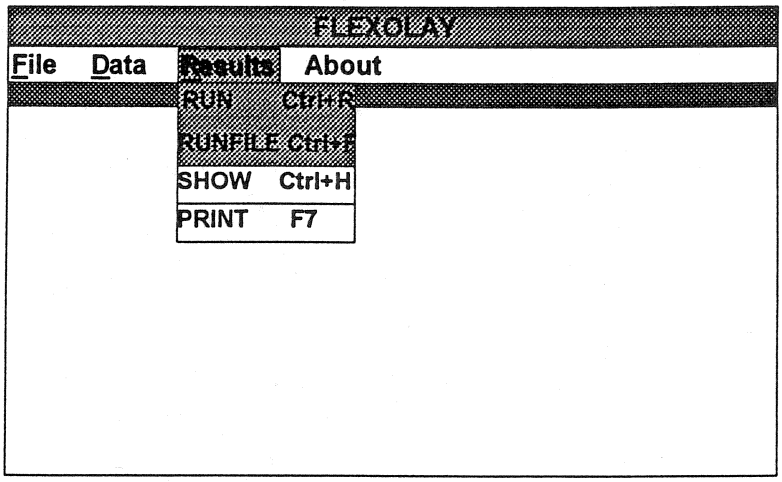


Figure 4 Results command menu.

Access to commands by the keyboard can be done by pressing Alt key. This will activate the menu bar. The command menu of interest, then, can be highlighted using the left and right arrow keys. Pressing Enter key will open the command menu and the command can be selected by using the up and down arrow keys. Once the command is selected, pressing Enter key will run the command. There are also short cut keys to activate a command menu and they are as follows :

- Alt+F to activate the file command menu.
- Alt+D to activate the data command menu.
- Alt+R to activate the results command menu.

4. Program Menu Bar Commands

Before describing the different commands under the different bar commands it is helpful to visualize the entire program operation as a hole. This can be can be done by understanding Figure. 5

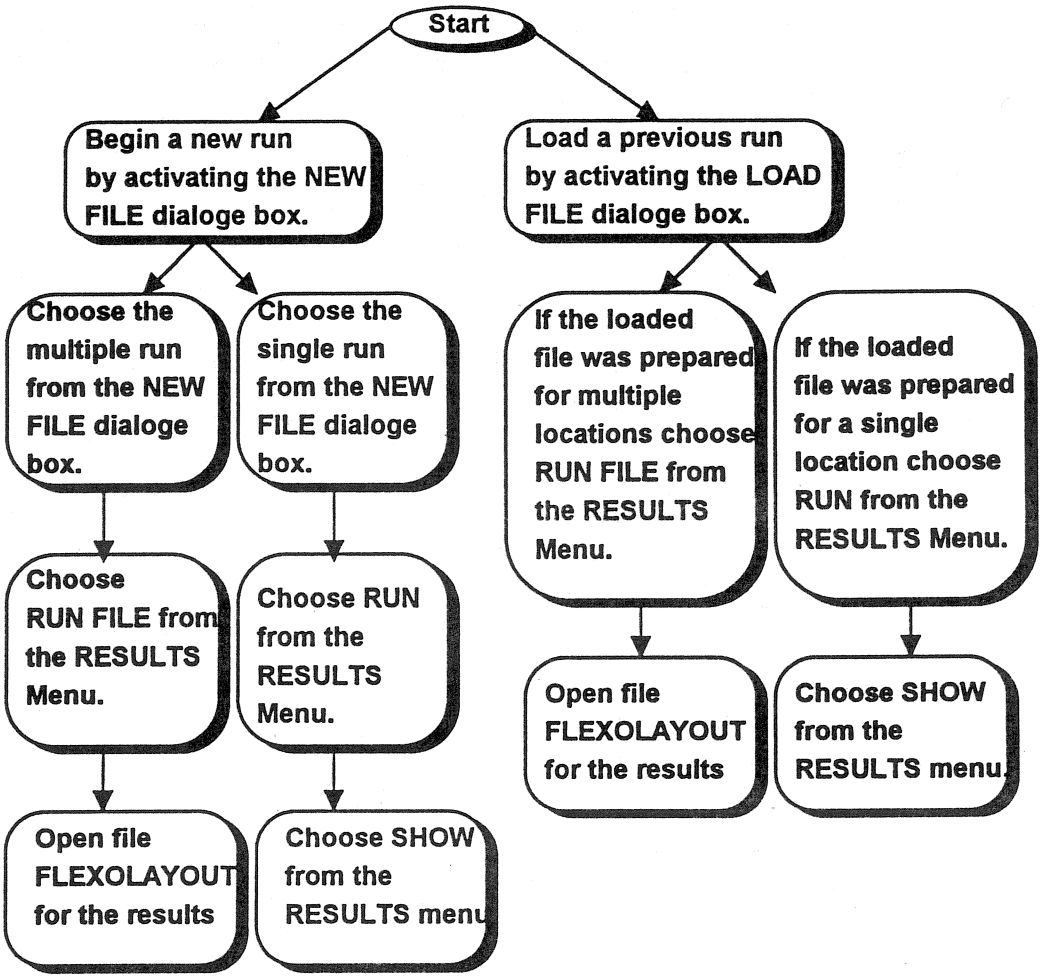


Figure 5. Overview of the program

The option of multiple locations facilitates running the program for different sets of moduli values as will be discussed later.

4.1 File Commands:

The file commands are :

- NEW (to clear the memory and open a new file - short cut key Ctrl+N).
- LOAD FILE (to load an existing file - short cut key F1).
- SAVE FILE (to save current file to disk - short cut key F2).
- Exit (to terminate the program - short cut key Ctrl+X).

The **new file** command opens a dialog box as shown in Fig. 6. The dialog box lets the user choose between two options:

- Running a single location.
- Running multiple locations.

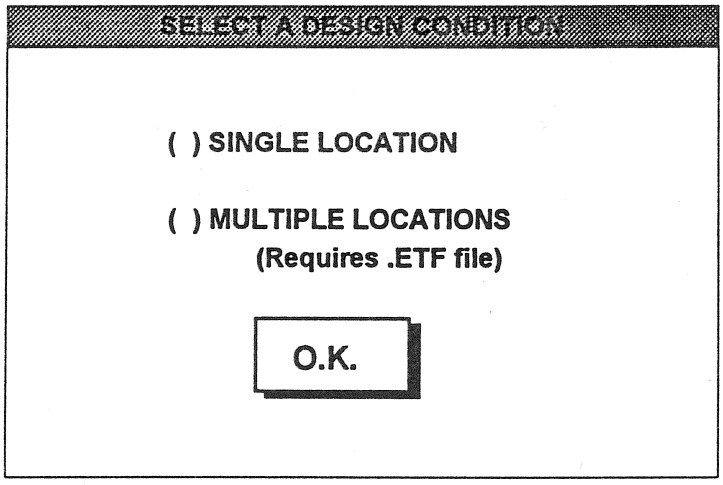


Figure 6. NEW file dialogue box

The **load file** command opens a dialog box as shown in Fig. 7 . The dialog box contains the following :

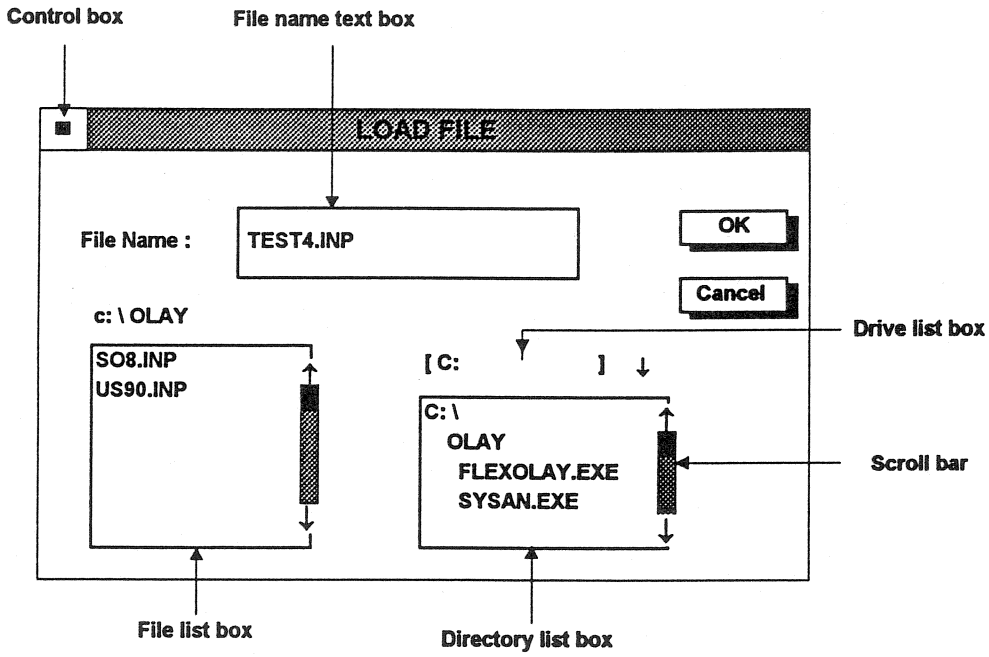


Figure 7 Load file dialog box.

- Drive list box : is the list of drives available (drive A, B, C etc..). The drives are listed when the down arrow attached is clicked. The drive can be selected by moving the mouse to the required drive name and clicking.
- Directory list box : is the list of the directories in the selected drive. The directory which contains the file to be loaded is selected by moving the mouse arrow to the required directory and then pressing the mouse button. The scroll bars attached to the box are used to scroll through the directory list by clicking on the up arrow for up movement or the down arrow for down movement.
- File list box : is the list of the files that are available in the current directory. The file to be loaded can be selected from this list box by moving the mouse pointer to the required file and then clicking. The scroll bars attached to the box are used to scroll through the file list by clicking on the up arrow for up movement or the down arrow for down movement.
- File name text box : the name of the file to be loaded is entered in this box.

Loading a file can be done by :

- directly typing the path (includes drive, directory and sub-directory) and the file name in the file name text box and then pressing the OK button. When typing the file name do not forget the extension, in this case "filename.INP".
- Selecting the drive, the directory and sub-directory, and the file name using the drive list box, the directory list box, and the file list box respectively and then pressing the OK button.

The selection between the options can be done by moving the mouse pointer to the required place (drive, directory, file, OK, Cancel, scroll bars, etc..) and pressing the mouse button. The keyboard also can be used by pressing the Tab key to move between the options (i.e. to move from the file text box to the file list etc..) and the Up and Down keys to scroll within the options.

The **save file** command opens a dialog box as shown in Fig. 8 to enter the path and the name of the file to be saved. Here also do not forget to type the extension of the file, again "filename.INP". The operations in the dialog box are the same as the ones for the load file dialog box.

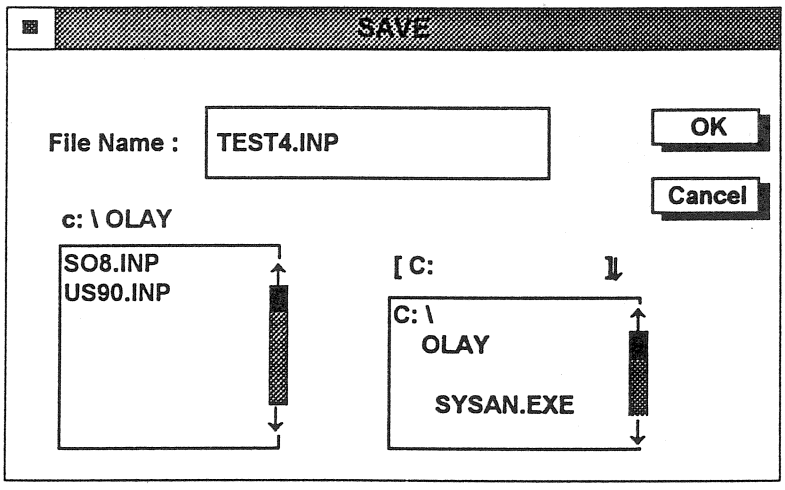


Figure 8 Save file dialog box.

When the **open file** or **save file** dialog boxes are activated only files with INP extension are listed but the program can load and run any file with any extension as long as it contains the correct format of the input data.

4.2 Data Commands:

The Data commands menu contains three sub forms: **Pavement**, **Soil Parameters** and **General**. Each screen has different control parameters which depend on the input data choices.

The **pavement data** input screen is shown in Fig. 9. Listed below are the definitions of terms used in the screen.

- Crack index : The user needs to enter a value between 0 and 5 for the crack index measured in accordance to the State of Idaho procedures. This index, however, is not used in any calculation. Thus any value will not affect the overlay design thickness.
- PAVE. TEMP. (F) : is the pavement temperature during FWD test in F.
- BS AND SBS option : the existing pavement section includes base and subbase.
- BS ONLY option : the existing pavement section includes base only.
- FULL AC option : the existing pavement section is full depth asphalt.
- E (ksi) : is the modulus of the layer in ksi.

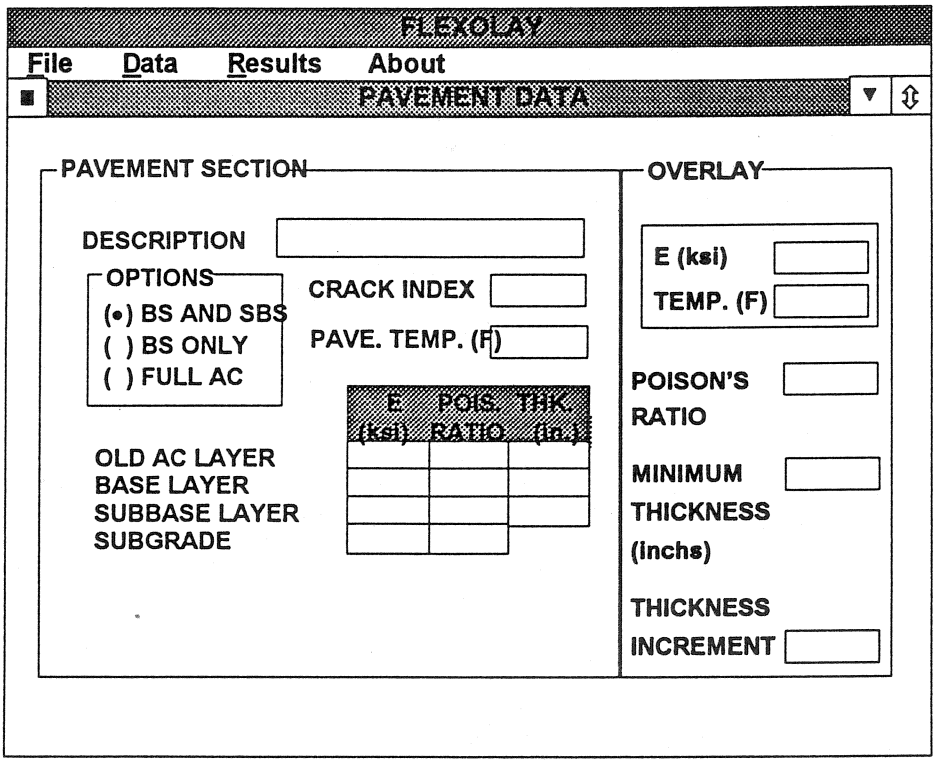


Figure 9 Pavement data screen with base and subbase included.

- POIS. RATIO : is the Poisson's ratio of the layer
- THICK. (in) : is the thickness of the layer in inches
- TEMP. (F): is the reference temperature at which the overlay modulus value was determined.
- MIN. THK.(in) : is the minimum overlay thickness required in inches.
- THK. ICR.(in) : is the overlay thickness increment in inches.

The screen changes as the selected option changes (i.e., changing the option between BS AND SBS ,BS ONLY and FULL AC). The base layer and the subbase layer disappear when FULL AC is selected. The subbase layer disappears when BS ONLY is selected. The data can be entered after moving the mouse pointer to the data boxes provided and pressing the mouse button. Also, the data can be entered after pressing the Tab key to move between the data boxes and the arrow keys to move between the options.

The **soil parameters** screen depends on the option selected in the pavement screen. The shape of the full screen is shown in Fig. 10. When the pavement

section includes base only, the subbase options will disappear and when the pavement section is full depth asphalt, the base and the subbase options will disappear. Listed below is the options used :

- FINE option : means that the subgrade is fine grained and stress dependent. When this options is selected the parameters K1 and K2 will appear, and it is required to enter the values in the data boxes provided.
- GRANULAR option : means that the layer is granular and stress dependent. When this options is selected, the parameters K1 and K2 will appear and it is required to enter the values in the data boxes provided.

- GRAN.[LINEAR] option : means that the layer is granular and considered as stress independent. When this option is selected, the parameters K1 and K2 will disappear.
- LINEAR option : means that the subgrade is considered as stress independent. When this option is selected, the parameters K1 and K2 will disappear.
- CEMENT T. B. option: means cement treated base. When this option is selected, the parameters K1 and K2 will disappear.
- BITUMEN T. B. option : means bitumen treated base. When this option is selected, the parameters Vb and Va will appear. Vb is the percentage bitumen volume and Va is the percentage air volume in the treated base. It is required to enter the values in the data boxes provided.

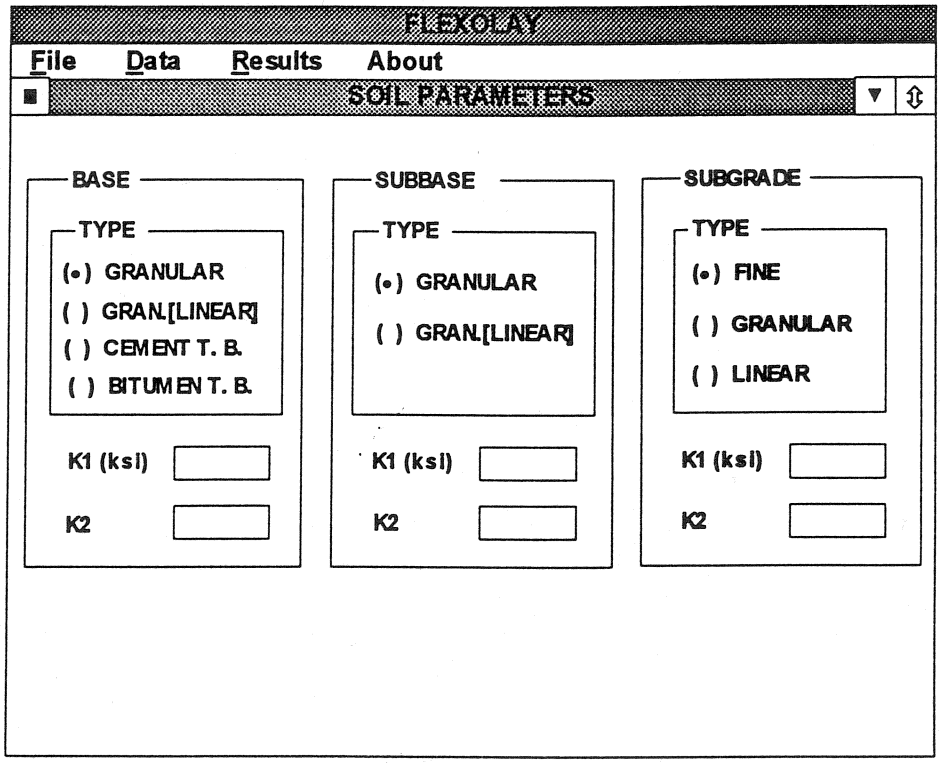


Figure 10 Soil parameters data full screen.

The options can be selected by moving the mouse pointer to required option and then pressing the mouse button. Also, the keyboard can be used by pressing the Tab key to select between the options and the up and down arrow key to select within the option.

The **general data** full screen is shown in Fig. 11 and it includes:

- DUAL TIRE LOAD in lb.
- DUAL TIRE SPACING in inches.
- TIRE PRESSURE in psi.
- ESTIMATED FUTURE : is the estimated future traffic repetitions in terms of equivalent single axle load for the design period.
- PAST ESAL : is past traffic repetitions in terms of equivalent single axle load.
- INCLD. PAST TEAFFIC : check box (when empty the past traffic label and the corresponding data box will disappear)

- FATIGUE SHIFT FACTOR FOR NEW AC : a default value of 18.4 is taken for this shift factor and can be changed here by the user.
- FATIGUE SHIFT FACTOR FOR OLD AC : a default value of 15 is taken for this shift factor and can be changed here by the user.

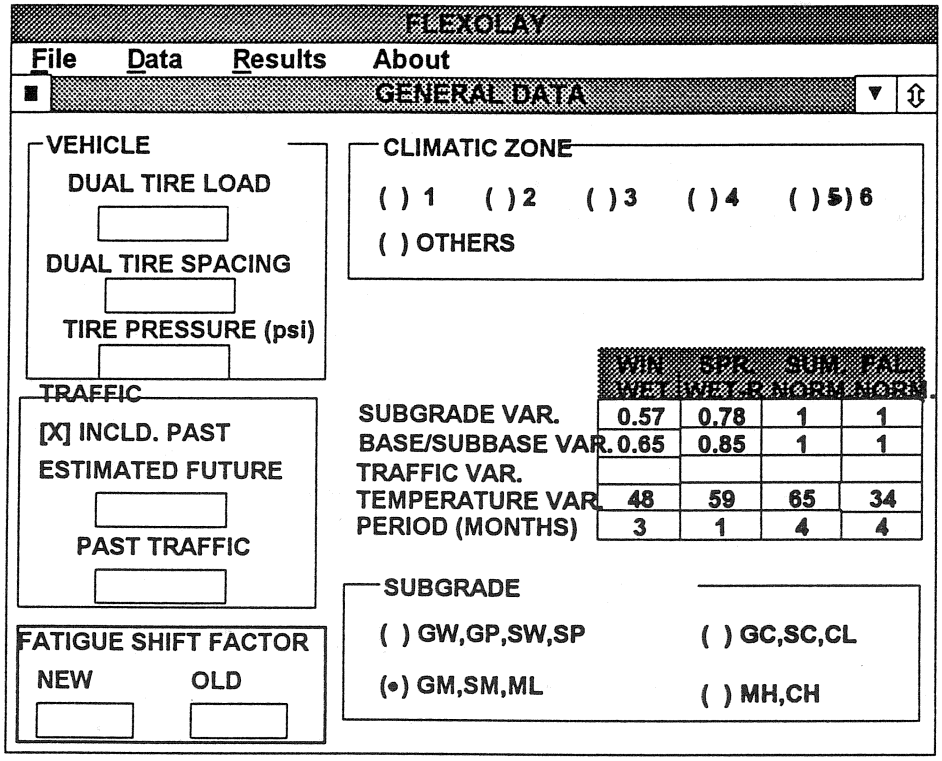


Figure 11 General data full screen.

- CLIMATIC ZONES option: is the pavement operating climate zone where the pavement section is located.
- SUBGRADE VAR. : is the seasonal subgrade modulus adjustment factor.
- BASE/SUBBASE VAR. : is the seasonal base\subbase modulus adjustment factor. (Will be disabled for full depth asphalt pavement section).
- TRAFFIC VAR. : is the seasonal variations in the traffic.
- TEMPERATURE VAR. : is the seasonal mean air temperature.
- PERIOD (MONTHS) : is the period of each season in months.

- SUBGRADE CLASSIFICATION options : is the subgrade classification according to the Unified Soil Classification system. These options only show when ZONE 3 or ZONE 6 is selected.

For ZONE 1 to 6 the SUBGRADE VAR., BASE/SUBBASE VAR., TEMPERATURE VAR. and PERIOD values are loaded automatically by the program and the user can not change these values. In order to change the values, the ZONE has to be selected as OTHERS. The SUBGRADE VAR. values depend on the subgrade modulus value entered in the pavement data screen and will change by changing the modulus.

The data are entered after moving the mouse pointer to the point of interest and pressing the mouse button. The keyboard can be used by pressing the Tab key to move the cursor to the point of interest.

4.3 Result Commands:

The result commands are :

- RUN to run the program for overlay calculations at a single location, i.e. running using one set of moduli values consisting of one modulus for each layer (short cut key Ctrl+R).
- RUN FILE here the user can run multiple locations without the need for re-entering the input values more than once, see section 4.4.
- SHOW (to show the results on the screen-short cut key Ctrl+H).
- PRINT (to print the results-short cut key F7).

After the completion of data entry, selecting the **RUN command** will start the overlay calculations and a running message will appear. The message informs the user about the operations that are taking place and the overlay thickness in use. After the completion of the running process, a summary of the results and the required overlay thickness can be seen on the screen by selecting the **show command** if the performed run was for single location. Detailed results can be printed by selecting the **PRINT command**. A dialog box as shown in Fig. 10 will be displayed when the PRINT command is selected. This dialog box contains the following :

- Printer port options (LPT1, LPT2, LPT3) : These options are selected when the results are required to be printed by a printer. The printer port to be selected is the port where the printer is connected (usually LPT1).
- File option : this option is selected when the results are required to be printed to a file.
- File name text box : When the file option is selected this box will be enabled, and it is required to enter the path and the name of the file to print the results to.

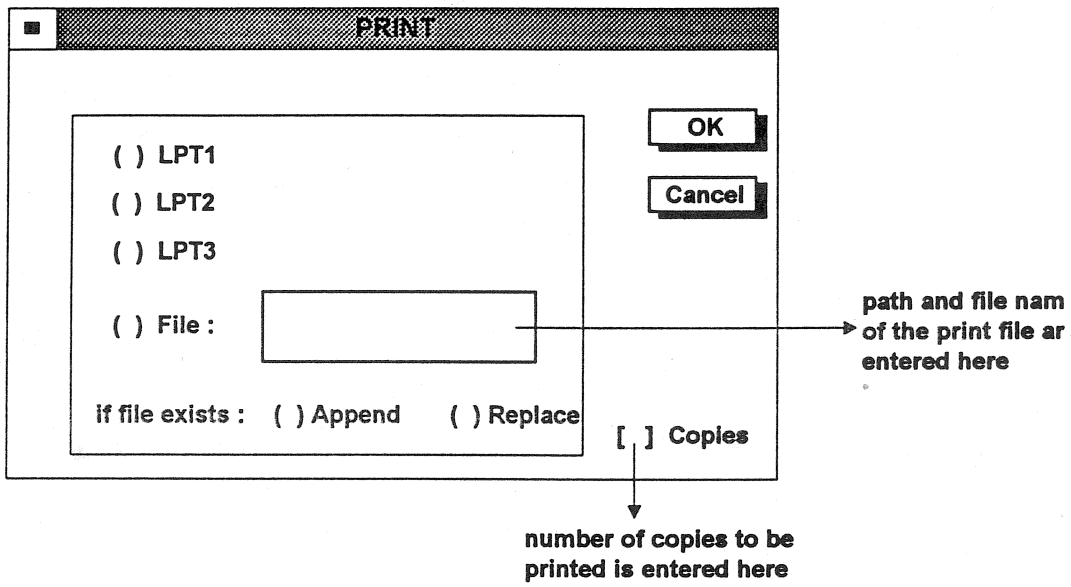


Figure 12 Print dialog box.

- Append option : this option is selected to stop the printing when a file has the same name as the name entered in the file name text box, and thus, preventing the program from replacing that file. This option only available when the file option is selected.
- Replace option : this option is selected to replace an existing file that has the same name as the one entered in the file name text box. This option is only available when the file option is selected.
- Copies : is the required number of copies to be printed.
  OK button : pressed to print the results.
- Cancel button : pressed to cancel the print command.

If the run was for multiple locations clicking the **show command** shows a message to tell the user that the output for the this run will be stored in file "filname.FLX".

4.4 RUN FILE Command:

Clicking this RESULTS Menu command calls for a file with extension .ETF which should be pre-prepared before activating this command. The ETF file is a DOS ASCII file which includes the FWD backcalculation results. It should be noted that the ETF file must be prepared separately in a format as given below:
The first row should include two inputs. In the first column the number of layers for this design excluding the new overlay. In the second column a header for this file, to make it easy for the user to identify the file. After this, each row represents a data set for a testing location (mile post. A single data set is provided in the following columns:
Column 1: pavement testing temperature
Column 2: mile post
Columns 3-6: Modului values for the existing pavement layers (in ksi).
It is to be noted that if the exiting pavement is a full depth (i.e., only one layer over the subgrade), the user needs to enter only two E values (surface and subgrade)in column 3 and 4. If two layers exist on top of the subgrade, three E values (Surface, base and subgrade) will be needed and so on.
Make sure to create the EFT file under any DOS editor, otherwise you will get a runtime error stating: "Check ETF file format".
An example of a ETF file is provided in the APPENDIX B.

5. Files created by Flexolay

First: If you are running a single location design, you can view the results with the Show command under Results in the main menu. If you want to print the output straight to a printer or to a file, choose Print from the Results menu. One of the files created by FLEXOLAY is this output file which you specify as noted previously.
Second: In order to run a multiple location design, you will choose the name of the ETF file for the input of the temperature and the Moduli

values. A file with the same name but with extension .FLX will be created by FLEXOLAY for the output of this multiple location design.
Third: If you get a runtime error, FLEXOLAY will create a file with the same name as the ETF file but with extension "LOG". You will find two numbers in this file, the first number indicates the type of error you have done according to the code in appendix A. If the second number is anything but 86 reinstall FLEXOLAY.

6. Example

Two example files are provided on the distribution diskette. Example 1 for a single location (one mile post) and example 2 for a pavement section with multiple locations (multiple mile posts). Input files are with extension (*.INP). For design with multiple locations, the output is always stored in a file with extension FLX as mentioned above. The listing for an example of the output file (FLX file) is attached in Appendix B.

An example of the suggested procedures to get accurate and satisfactory results is shown in Appendix C. The example shows how to analyze the data obtained from the backcalculation program MODULUS and decide upon reliable values to use for FLEXOLAY, for either single or multiple sections.

7. Questions and Technical Assistance

Please call or send a FAX to:

Fouad Bayomy (208) 885-6784 FAX (208) 885-6608

Appendix A

List of Errors and Possible Solutions

ERROR NUMBER	*POSSIBLE SOLUTION(S)*
7	• If you are running the program from the A drive, copy the program into a sperate directory in the C drive and try running it from there. • Divid your ETF file into two or more parts and try running each one alone. • Check system configurations.
14	• You have specified a long file name.
25, 57, 68	• Check the drive you are trying to read from.
52, 64	• Bad file name.
53	• File not found.
61	• Disk full.
70, 71	• Make sure the floppy disk is not write protected.
75, 76	• Invalid path for the file in use.
342	• Your ETF file is too large.

Appendix B

Example of an ETF File and the Corresponding Output FLX File

4 Example of ETF file for with 4 moduli values (excluding overlay)

101	454.500	281.	92.4	97.8	3.3
102	454.600	857.	252.1	87.7	2.9
103	454.700	336.	190.6	116.2	3.9
104	454.800	382.	154.5	95.2	3.2
106	454.900	427.	186.1	86.3	2.9
105	455.000	360.	144.2	83.7	2.8
106	455.000	618.	164.2	77.4	2.6
107	455.100	756.	239.5	70.6	2.5
108	455.200	765.	254.9	59.2	2.5
108	455.300	755.	223.2	76.7	2.6
109	455.400	811.	267.2	70.7	2.7
109	455.500	284.	98.0	125.2	4.2
110	455.600	249.	42.3	96.0	6.1
111	455.712	200.	143.2	77.0	6.3

INPUT FILE : EXAPPB.INP

DESCRIPTION : Example: to be run with ETF in Appendix B

1. SUMMARY OF INPUT DATA

1.1 TRAFFIC DATA

DESIGN DUAL TIRE LOAD = 4500
DESIGN DUAL TIRE SPACING = 13.5
TIRE PRESSURE (psi) = 80
DESIGN FUTURE TRAFFIC (ESALs) = 4000000
ESTIMATED PAST TRAFFIC (ESALs) = 0
FATIGUE SHIFT FACTOR FOR NEW ASPHALT = 18.4
FATIGUE SHIFT FACTOR FOR OLD ASPHALT = 8

1.2 SEASONAL VARIATION DATA

	WINTER	SPRING	SUMMER	FALL
SUBGRADE VARIATION	0.44	0.72	1.00	1.00
BASE/SBASE VARIATION	0.65	0.85	1.00	1.00
TRAFFIC VARIATION	1.00	1.00	1.00	1.00
TEMPERATURE VARIATION	48.00	59.00	65.00	34.00
PERIOD (MONTHS)	3.00	1.00	4.00	4.00

1.3 PAVEMENT DATA

CRACK INDEX = 2.5
CLIMATIC ZONE : 6
TEMPERATURE AT FWD TEST = 0
OLD AC BITUMEN VOLUME (Vb) % = 11
OLD AC AIR VOLUME (Va) % = 5

	POISSON RATIO	THICKNESS (in.)
OLD AC LAYER	0.20	03.50
BASE LAYER	0.35	05.50
SUBBASE LAYER	0.40	08.80
SUBGRADE	0.45	SEMI-INFINITE

SUBGRADE TYPE : LINEAR

BASE TYPE : LINEAR
SUB-BASE TYPE : LINEAR

OVERLAY MODULUS(ksi) = 350 AT TEMPERATURE (F) = 77
POISSON RATIO = .2
MINIMUM THICKNESS = 2
BITUMEN VOLUME (Vb) % = 11 AIR VOLUME (Va) % = 5

ETF FILE : EXAPPB.ETF

Example of ETF file for with 4 moduli values (excluding overlay)

CASE	MILE POST	TEMPERATURE	E1	E2	E3	E4	OVERLAY	DAMA1	DAMA2	DAMA3	DAMA4	DAMA22
1	454.5	101	281	92.4	97.8	3.3	3	.00156	.20522	0	.9893	0
2	454.6	102	857	252.1	87.7	2.9	2	.00523	.04812	0	.84948	0
3	454.7	103	336	190.6	116.2	3.9	2	.00001	.03526	0	.59307	0
4	454.8	104	382	154.5	95.2	3.2	2.5	.00001	.08011	0	.93573	0
5	454.9	106	427	186.1	86.3	2.9	3	.00005	.05104	0	.85059	0
6	455	105	360	144.2	83.7	2.8	3.5	.00002	.08082	0	.908	0
7	455	106	618	164.2	77.4	2.6	3.5	.00063	.08458	0	.9373	0
8	455.1	107	756	239.5	70.6	2.5	3.5	.00191	.04323	0	.81145	0
9	455.2	108	765	254.9	59.2	2.5	3.5	.00219	.04297	0	.97203	0
10	455.3	108	755	223.2	76.7	2.6	3	.00247	.05368	0	.90534	0
11	455.4	109	811	267.2	70.7	2.7	3	.00314	.03815	0	.8239	0
12	455.5	109	284	98	125.2	4.2	2	.00119	.21253	0	.72722	0

13	455.6	110	249	42.3	96	6.1	3	.01494	.87363	0	.77361	0
14	455.712	111	200	143.2	77	6.3	2	.01307	.07643	0	.88567	0

DAMA1 = FATIGUE DAMAGE ON OVERLAY
DAMA2 = FATIGUE DAMAGE ON OLD AC
DAMA3 = FATIGUE DAMAGE ON BTB
DAMA4 = RUTTING DAMAGE
DAMA22 = FATIGUE DAMAGE DUE TO PAST TRAFFIC

Appendix C

Example of Suggested Method of Analysis

APPENDIX C

Example of Suggested Method of Analysis

A suggested method for analyzing the FWD data to get the moduli values of the different layers and use them to create an .INP file for FLEXOLAY is presented here. FWD tests made on US-30, from milepost 447.00 to 455.00, were used. MODULUS backcalculation program was used to assist in obtaining E values. The following procedures were made twice, once for the FWD data made before an overlay was placed and the other time for the FWD data after the overlay was constructed.

Concept:

To determine the required overlay thickness, the backcalculated E values from FWD data using Modulus program were analyzed to establish representative E values for each pavement section. Then these E values were used in FLEXOLAY program for single design case to design an overlay for each section.

- Step 1: A run of MODULUS was made for the hole part of the road under study, and the variations of the moduli values were plotted. Also the variation of the last deflection, D7, was plotted. This was done for FWD data before the construction of the overlay (pre-construction).
- Step 2: By analyzing the variation of E values and D7, the road was divided into three sections. The first section was identified from mile-post 447.00 to 449.50. The second was identified from milepost 450.50 to 454.00. Finally the third section was from mile-post 454.50 456.00.
- Step 3: MODULUS program was used again separately for each section. Several runs were made with different seed values until the most satisfactory values were obtained. This step is done to refine the data file by eliminating data points with outliers. This step involves engineering judgment and is dependent on the pavement designer experience.
- Step 4: The 87.5 percentile values of the moduli were calculated to be used later as input in the FLEXOLAY program.
- Step 5: The E values obtained from step 4 along with all other necessary inputs were used to create the input file for FLEXOLAY (.INP). The thicknesses of the required overlay were obtained for all three sections.
- Step 6: The above 5 steps were repeated for FWD data made after the construction of the overlay (post-construction).

Results of the above analysis revealed the following overlay thicknesses:

Section	Overlay Thickness (in) (Pre-construction)	Overlay Thickness (in) (Post-construction)
1	6.5	5
2	5	3
3	6	5

As noticed the average overlay thickness for the original pavement section (pre-construction) is 5.8". The procedure indicated 4.33" still needed for the assumed traffic and design life. It is to be noted that for this particular pavement section, the existing overlay is 3.75" which is about 2" smaller than the needed one at the time of construction. Flexolay, however, predicted a need of additional 4.33" on to be added to new overlay. This makes a difference of almost 50%. It is believed that this difference is attributed to the shift factors used and inherited variability in backcalculated E values from FWD results.

If the variation of the overlay with the milepost is required prepare .ETF files (as was shown in Appendix B) for FLEXOLAY for each section, pre-construction and post-construction. Run FLEXOLAY and compare the overlays of pre-construction and post-construction at the different mileposts.

The next few pages are the outputs of MODULUS that were used in FLEXOLAY for the pre-construction case only.

TTI MODULUS ANALYSIS SYSTEM (SUMMARY REPORT) (Version 4.2)

District: 5
Temp. : 105
Highway/Road: US030

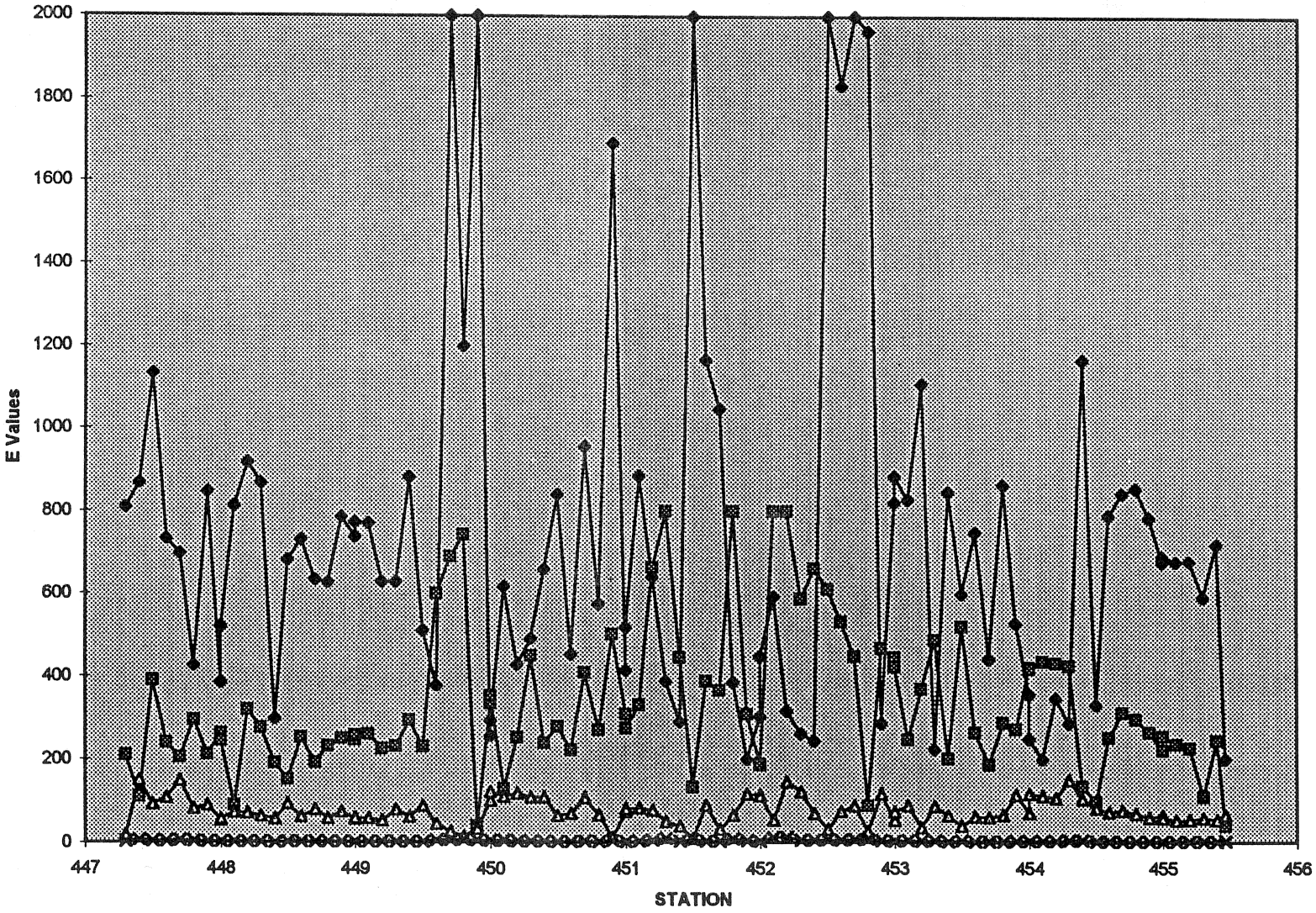
		Thickness(in)	MODULI RANGE(psi) Minimum	Maximum	Poisson Ratio Values
Pavement	H1:	5.2	200,000	2,000,000	0.35
Base:	H2:	3.6	40,000	800,000	0.35
Subbase:	H3:	10.8	10,000	150,000	0.45
Subgrade	H4:	59.9	10,000		0.45

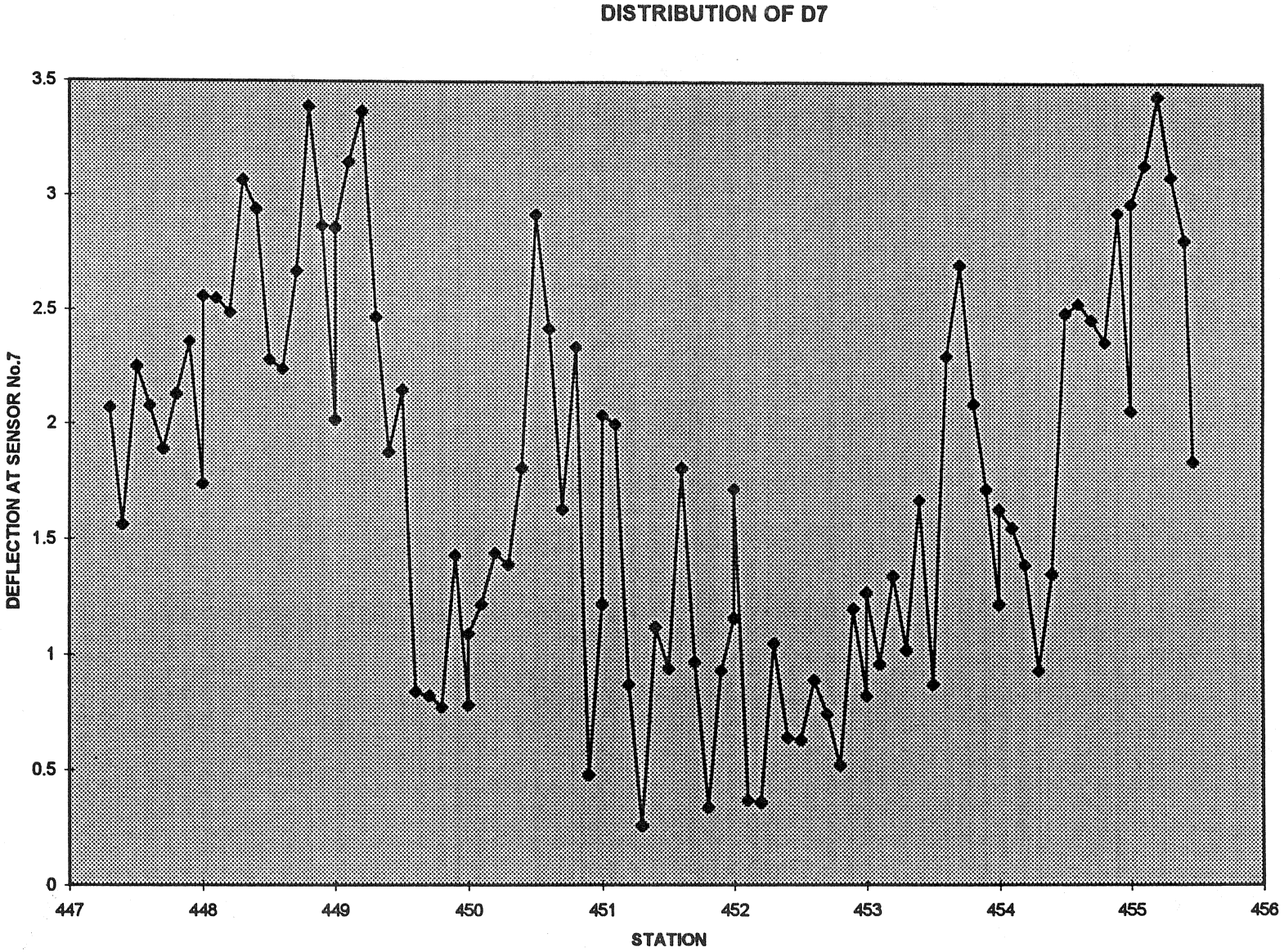
Station	Load (lbs)	Measured Deflectio (mils): R1	R2	R3	R4	R5	R6	R7	(E1)	Calculated Moduli values (ksi): (E2)	(E3)	(E4)	ERR/Sens	Absolute Dpth to Bedrock
447.3	11,881	25.33	20.62	16.77	11.74	8.22	4.2	2.07	810	209	17.9	2.7	5.52	76.57
447.4	11,817	11.22	8.15	6.14	4.05	2.94	2	1.56	869	110.2	150	5.9	2.2	95.77
447.5	11,877	12.89	10.08	8.29	6.1	4.61	3.25	2.25	1134	389.5	92.5	3.9	3.14	99.07
447.6	11,714	13.74	10.64	8.54	6.02	4.53	3.11	2.08	734	238.9	109.2	3.6	1.53	96.12
447.7	11,936	11.61	8.52	6.65	4.65	3.37	2.44	1.89	698	203.8	149.4	5	2.46	117.92
447.8	11,694	17.33	13.46	10.42	7.18	5.49	3.54	2.13	427	293.8	82.1	3.3	1.73	87.63
447.9	11,786	15.9	12.2	9.77	7.11	5.57	3.85	2.36	848	211.6	90.6	3	2.45	86.57
448	8,385	15.96	12.67	9.72	6.72	5.05	3.14	1.74	386	261.3	53.8	2.6	1.91	84.71
448	11,658	21.17	16.97	13.3	9.5	7.24	4.6	2.56	520	244.9	57.4	2.4	1.8	84.1
448.1	11,722	19.53	14.86	11.41	8.18	6.48	4.5	2.55	813	90.1	73.4	2.7	3.59	82.73
448.201	11,738	15.22	12.46	10.37	7.63	5.87	3.94	2.49	918	318.7	72.2	3.2	4.84	90.68
448.3	11,658	16.22	13.37	11.37	8.49	6.78	4.8	3.07	868	276	64.3	2.9	8.32	93.71
448.404	11,563	26.22	20.33	16.18	11.75	8.98	5.66	2.94	298	191.4	57.4	1.9	2.13	83.43
448.5	11,714	16.52	12.26	9.53	6.89	5.43	3.86	2.28	683	152.3	94.2	3.1	3.64	83.16
448.6	11,408	19.04	14.58	11.78	8.91	6.96	4.42	2.24	732	252	62.7	2.5	2.6	77.56
448.705	11,611	18.57	13.52	11.11	8.28	6.36	4.35	2.67	635	192.9	79.2	2.6	2.9	89.16
448.8	11,591	20.63	16.43	13.26	9.9	7.78	5.56	3.39	628	231.5	58.7	2.3	4.09	89.47
448.9	11,611	17.8	13.65	11.07	8.31	6.63	4.74	2.87	788	249.6	74.4	2.6	4.04	86.39
449	8,306	13.68	11.31	9.26	6.8	5.19	3.54	2.02	739	246.2	58.2	2.5	3.59	85.43
449	11,631	18.24	15.09	12.52	9.5	7.35	5.09	2.86	775	257.1	60	2.6	6.59	82.67
449.1	11,579	18.84	14.81	12.07	9.16	7.33	5.15	3.15	772	260	58.9	2.6	5.59	87.84
449.2	11,269	21.15	16.64	13.4	9.93	7.28	5.27	3.37	629	225.6	53.9	2.3	2.1	95.64
449.303	11,360	17.3	13.61	10.97	7.79	5.99	4.2	2.47	629	231.9	80.2	2.7	2.03	87.05
449.401	11,265	16.06	13.35	11.18	8.04	5.59	3.65	1.88	883	294.3	62.8	2.9	3.04	80.66

449.5	11,293	16.61	12.55	9.91	7.29	5.49	3.76	2.15	511	230.1	89.4	3	1.79	81.65
449.6	11,269	14.83	10.89	8.03	4.97	3.34	1.67	0.84	378	600.2	45.3	6	2.98	70.37
449.704	11,364	9.94	8.06	6.58	4.74	3.31	1.7	0.82	2000	690.5	27.6	6.9	5.82	66.56
449.8	11,364	12	9.17	7.22	4.77	2.62	1.48	0.77	1200	743.9	15.2	7.4	3.41	69.26
449.9	11,583	12.66	10.31	7.64	5.04	3.66	2.36	1.43	2000	40	33.5	7	14.15	83.97
450	8,174	10.83	7.59	5.67	3.83	2.72	1.59	0.78	256	335.3	102.2	4.9	1.75	75.01
450	11,464	13.84	9.83	7.52	5.24	3.76	2.28	1.09	293	353.1	123.6	4.8	1.63	73.02
450.1	11,353	12.66	9.09	6.63	4.41	3.11	1.96	1.22	618	129.9	111.8	5.7	1.35	82.78
450.2	11,293	13.96	10.22	8.09	5.69	4.21	2.8	1.44	429	251.9	118.4	3.9	1.56	76.51
450.301	11,547	12.9	9.81	7.75	5.44	3.97	2.46	1.39	492	450.6	109.9	4.5	1.97	79.44
450.4	11,480	13.84	10.47	8.18	5.96	4.57	3.14	1.81	660	239.5	109.6	3.7	2.1	79.44
450.5	11,452	16.87	13.47	11.01	8.5	6.86	4.87	2.92	841	278.3	65.7	2.8	6.98	83.84
450.6	11,337	20.17	15.42	12.43	9.32	7.05	4.44	2.42	454	222.2	71.1	2.4	2.42	81.7
450.7	11,349	11.73	9.13	7.43	5.46	4.14	2.61	1.63	958	408.8	108.3	4.1	2.44	82.15
450.801	11,337	18.32	14.43	11.57	8.55	6.26	3.95	2.34	576	271	66.7	2.7	2.05	85.96
450.9	11,464	13.44	10.8	8.85	6.27	4.43	2.07	0.48	1692	502.8	12.6	5.6	6.37	66.66
451	8,214	12.85	10.02	7.8	5.49	4.13	2.56	1.22	414	308.6	74.4	3.1	2	76.56
451	11,444	17.32	13.78	10.69	7.88	6.26	3.83	2.04	519	274.8	82.6	2.8	2.35	77.87
451.1	11,448	14.5	11.46	9.32	6.91	5.08	3.33	2	886	330.6	83.2	3.3	1.78	83.88
451.201	11,460	11.05	8.43	6.22	4.31	2.85	1.66	0.87	641	665.1	79	6.7	0.79	72.59
451.301	11,547	11.6	7.87	5.66	3.48	2.12	0.85	0.26	388	800	50.9	9.9	5.06	61.22
451.403	11,400	19.25	13.99	10.52	6.73	4.52	2.28	1.12	290	445.5	40.5	4.5	3.16	72.98
451.5	11,488	13.96	11.03	8.88	6.26	4.15	2.17	0.94	2000	133.5	10	7.2	17.88	71.03
451.601	11,436	11.42	9.22	8.03	6.41	5.22	3.39	1.81	1167	388.9	90.3	3.9	10.18	72.97
451.7	11,388	17.31	13.26	10.65	7.6	5.53	3	0.97	1048	365.9	32.7	3.7	3.89	70.48
451.8	11,444	11.13	7.69	5.66	3.44	2.18	1.03	0.34	386	800	67.1	9.2	3.29	65.46
451.902	11,412	14.55	9.46	7.13	4.74	3.22	1.81	0.93	200	308.9	118.3	5.8	2.06	74.36
452	8,099	11.24	8.01	6.1	4.25	3.18	1.99	1.16	304	188.4	115	3.9	1.69	82.69
452	11,432	14.85	10.68	8.22	5.98	4.57	2.89	1.72	449	187.4	114.3	3.8	1.98	81.57
452.1	11,571	9.1	6.22	4.51	2.57	1.39	0.68	0.37	593	800	54.6	13.5	2.42	65.2
452.2	11,400	8.31	5.27	3.86	2.34	1.49	0.72	0.36	316	800	145.9	13.1	3.21	62.7
452.3	11,388	12.78	8.85	6.89	4.5	3.18	1.85	1.05	261	587.9	122.6	5.9	2.41	77.28
452.401	11,384	14.31	9.68	7.21	4.7	3.11	1.39	0.64	245	662.4	70.9	6.6	4.91	65.08
452.5	11,444	9.33	7.18	5.75	3.99	2.76	1.4	0.63	2000	610.8	33	8.1	4.31	65.65
452.6	11,468	9.61	7.44	6.09	4.43	3.25	1.89	0.89	1833	531.8	76	6.1	3.43	69.37
452.7	11,547	8.42	6.45	5.19	3.6	2.55	1.38	0.74	2000	448.2	88.7	7.7	4.13	67.27
452.8	11,416	12.09	9.64	6.41	3.67	2.23	1.08	0.52	1965	89.1	27.9	9.1	2.23	66.36

452.9	11,368	13.93	9.95	7.81	5.42	3.91	2.3	1.2	287	468.4	117.2	4.7	2.36	76.96
453	7,960	9.99	7.65	6.14	4.24	2.95	1.72	0.82	822	445.4	53.6	4.5	2.6	75.82
453	11,309	13.15	10.13	8.24	5.9	4.24	2.55	1.27	884	423	74.5	4.2	2.87	75.26
453.1	11,396	12.35	9.47	7.04	4.87	3.62	2.09	0.96	828	247.7	88.9	5.2	2.33	70.7
453.2	11,273	15.37	12.62	10.52	7.66	5.14	3.09	1.34	1108	369.3	36.9	3.7	4.15	74.36
453.3	11,293	15.87	11.17	8.38	5.57	3.87	2.19	1.02	224	487.9	87	4.9	1.96	74.97
453.4	11,253	17.22	13.69	11.14	8.16	6.07	3.67	1.67	846	201.7	65.7	2.8	3.33	75.4
453.5	11,372	14.85	11.29	8.76	5.63	3.65	2.1	0.87	599	520.3	40.8	5.2	1.64	74.15
453.6	11,233	17.71	14.14	11.78	8.78	6.22	4.15	2.3	749	264.1	63.2	2.6	2.34	83.12
453.702	11,186	22.55	17.06	13.87	10.54	7.91	5.05	2.7	442	186.4	61.9	2.1	2.61	82.1
453.804	11,452	15.43	12.99	11.08	8.57	6.7	4.21	2.09	863	287.5	66.8	2.9	7.57	75.82
453.901	11,269	12.93	9.76	7.57	5.25	3.89	2.57	1.72	528	272.7	114.9	4.3	1.39	92.12
454	8,107	11.57	8.52	6.69	4.5	3.15	1.84	1.22	356	421.5	71.4	4.2	2.37	80.68
454	11,392	15.08	10.76	8.54	5.97	4.27	2.59	1.63	248	417.1	118.2	4.2	2.11	82.05
454.1	11,337	15.9	10.96	8.68	5.75	4.13	2.52	1.55	200	435.8	112.4	4.4	2.17	85.58
454.2	11,396	14.19	10.43	8.27	5.76	4.19	2.48	1.39	346	432.1	107.6	4.3	2.59	79.03
454.3	11,392	12.28	8.15	6.46	4.64	3.37	1.89	0.93	286	425.6	150	5.6	3.46	71.16
454.402	11,293	11.71	8.99	6.75	4.69	3.42	2.13	1.35	1165	134.1	105.1	5.1	1.63	80.15
454.502	10,955	20.83	13.95	10.57	7.88	6.09	4.12	2.49	331	98.1	82.7	2.8	4.81	85.74
454.6	11,237	16.93	13.11	10.83	8.23	6.41	4.3	2.53	790	250.6	72.6	2.6	2.84	84.26
454.701	11,186	14.34	12.02	10.12	7.22	5.56	3.83	2.46	842	311.8	77.6	3.1	4.92	95.21
454.8	11,412	16.26	12.65	10.32	7.73	5.98	4.01	2.36	854	295.6	69.9	3	2.87	83.7
454.9	11,368	18.23	14.1	11.77	8.97	7.08	4.89	2.93	785	264.5	59.9	2.6	5.96	86.96
455	7,948	14.19	10.49	8.68	6.62	5.26	3.59	2.06	676	221.5	65.3	2.3	3.96	84.89
455	11,253	18.75	14.43	12.17	9.45	7.59	5.2	2.97	691	255.1	58.5	2.6	7.85	83.58
455.1	11,257	20.53	15.47	12.94	9.89	7.88	5.47	3.14	677	235.8	53.5	2.4	6.12	85.83
455.2	11,217	20.49	15.48	13.19	10.2	8.22	5.8	3.44	679	226.3	55.3	2.3	7.12	88.5
455.3	11,110	23.13	18.19	13.81	10.3	8.18	5.55	3.09	591	109.7	59	2	2.44	81.49
455.4	11,281	19.69	15.36	12.9	9.77	7.65	4.94	2.81	721	244	54.4	2.4	5.3	85.53
455.467	11,102	25.96	15.92	10.67	6.73	4.75	3.06	1.84	200	40	66.2	3.7	4.35	89.29
Mean:		15.4	11.71	9.3	6.66	4.95	3.15	1.77	737	330.8	76	4.3	3.65	79.51
Std.	Dev:	3.9	3.11	2.63	2.13	1.79	1.33	0.84	450	178	31.2	2.2	2.61	9.01
Var	Coeff(%):	25.3	26.59	28.29	32.02	36.1	42.25	47.38	61	53.8	41.1	52.1	71.51	11.33

PRECONSTUCTION MODULI DISTRIBUTION




DISTRIBUTION OF D7
DEFLECTION AT SENSOR No.7
3.5
3
2.5
2
1.5
1
0.5
0
447
448
449
450
451
452
453
454
455
456
STATION

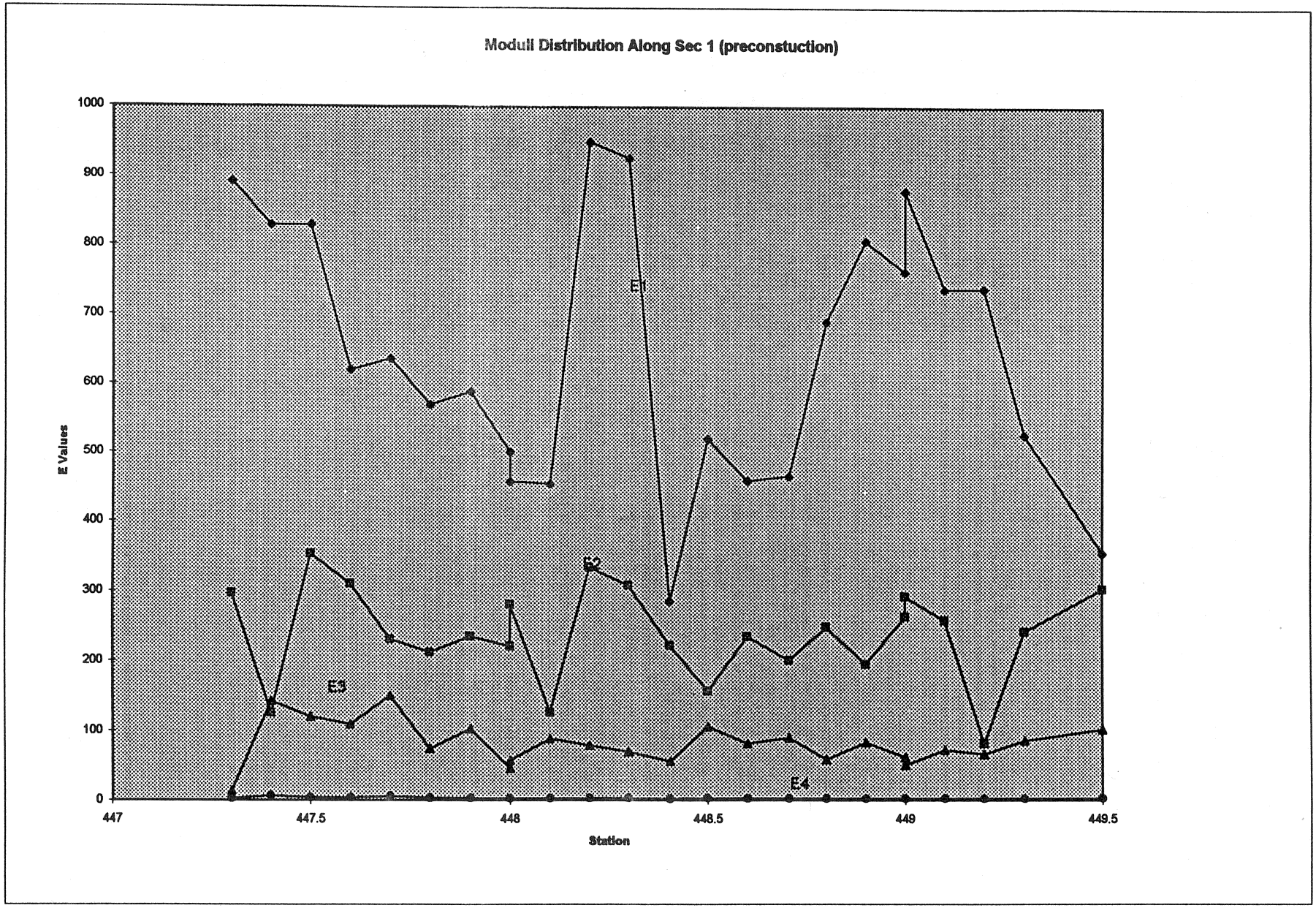
TTI MODULU ANALYSI SYSTEM (SUMMAR REPORT) (Version 4.2)

District: 5
Temp. : 85
Highway/Road: US030

		Thickness(in)	MODULI Minimum	RANGE(psi) Maximum	Poisson Ratio Values
Pavement:	H1:	5.2	200,000	2,000,000	0.35
Base:	H2:	3.6	40,000	800,000	0.35
Subbase:	H3:	10.8	10,000	150,000	0.45
Subgrade:	H4:	67	10,000		0.45

Station	Load (lbs)	Measured Deflection (mils): R1	R2	R3	R4	R5	R6	R7	Calculated Moduli values (ksi): SURF(E1)	BASE(E2)	SUBB(E3)	SUBG(E4)	ERR/Sens	Absolute Dpth to Bedrock
447.3	11,881	25.33	20.62	16.77	11.74	8.22	4.2	2.07	892	297.4	13.5	3	4.9	76.57
447.4	11,817	11.22	8.15	6.14	4.05	2.94	2	1.56	828	125.9	142.8	6.8	2.15	95.77
447.5	11,877	12.89	10.08	8.29	6.1	4.61	3.25	2.25	829	353.3	120.6	4	1.3	99.07
447.6	11,714	13.74	10.64	8.54	6.02	4.53	3.11	2.08	619	311	109.7	4.2	1.45	96.12
447.7	11,936	11.61	8.52	6.65	4.65	3.37	2.44	1.89	636	231.1	150	5.8	2.34	117.92
447.8	11,694	17.33	13.46	10.42	7.18	5.49	3.54	2.13	569	212.2	74.1	3.7	1.84	87.63
447.9	11,786	15.9	12.2	9.77	7.11	5.57	3.85	2.36	588	235.6	102.6	3.4	1.98	86.57
448	8,385	15.96	12.67	9.72	6.72	5.05	3.14	1.74	501	221.2	45.9	3	1.83	84.71
448	11,658	21.17	16.97	13.3	9.5	7.24	4.6	2.56	458	281.6	57.5	2.8	1.85	84.1
448.1	11,722	19.53	14.86	11.41	8.18	6.48	4.5	2.55	455	126.2	88.7	3	2.06	82.73
448.201	11,738	15.22	12.46	10.37	7.63	5.87	3.94	2.49	950	334.5	79.3	3.3	2.04	90.68
448.3	11,658	16.22	13.37	11.37	8.49	6.78	4.8	3.07	926	308.7	69.9	3.1	5.94	93.71
448.404	11,563	26.22	20.33	16.18	11.75	8.98	5.66	2.94	285	222.3	55.9	2.2	2.14	83.43
448.5	11,714	16.52	12.26	9.53	6.89	5.43	3.86	2.28	520	156.9	106.1	3.5	2.74	83.16
448.6	11,408	19.04	14.58	11.78	8.91	6.96	4.42	2.24	459	235.2	81.8	2.7	2.43	77.56
448.705	11,611	18.57	13.52	11.11	8.28	6.36	4.35	2.67	466	201.1	89.6	3	2.36	89.16
448.8	11,591	20.63	16.43	13.26	9.9	7.78	5.56	3.39	689	249.1	59.1	2.5	2.78	89.47
448.9	11,611	17.8	13.65	11.07	8.31	6.63	4.74	2.87	806	195.5	83.5	2.8	2.84	86.39
449	8,306	13.68	11.31	9.26	6.8	5.19	3.54	2.02	761	263.8	62.5	2.6	1.58	85.43
449	11,631	18.24	15.09	12.52	9.5	7.35	5.09	2.86	879	292.9	50.7	2.9	5.63	82.67
449.1	11,579	18.84	14.81	12.07	9.16	7.33	5.15	3.15	736	258.2	72.4	2.6	2.73	87.84
449.2	11,269	21.15	16.64	13.4	9.93	7.28	5.27	3.37	736	81.6	66.5	2.5	2.06	95.64
449.303	11,360	17.3	13.61	10.97	7.79	5.99	4.2	2.47	525	242.3	86.1	3	1.63	87.05
449.5	11,293	16.61	12.55	9.91	7.29	5.49	3.76	2.15	355	303.8	102.1	3.4	1.24	81.65
						The 87.5% value of E's =			**457.625**	**153.0625**	**55.25**	**2.5875**		
Mean:		17.47	13.69	11	8	6.1	4.1	2.44	663	244.5	80.3	3.3	2.54	86.61
Std. Dev:		3.67	3.02	2.47	1.86	1.43	0.92	0.5	208	71.9	31.5	1	1.24	7.23
Var Coeff(%):		21.02	22.04	22.49	23.3	23.41	22.46	20.43	31	29.4	39.2	30.5	48.92	8.35

SEC1PRE


Moduli Distribution Along Sec 1 (preconstuction)
E Values
1000
900
800
700
600
500
400
300
200
100
0
447
447.5
448
448.5
449
449.5
Station
E1
E2
E3
E4

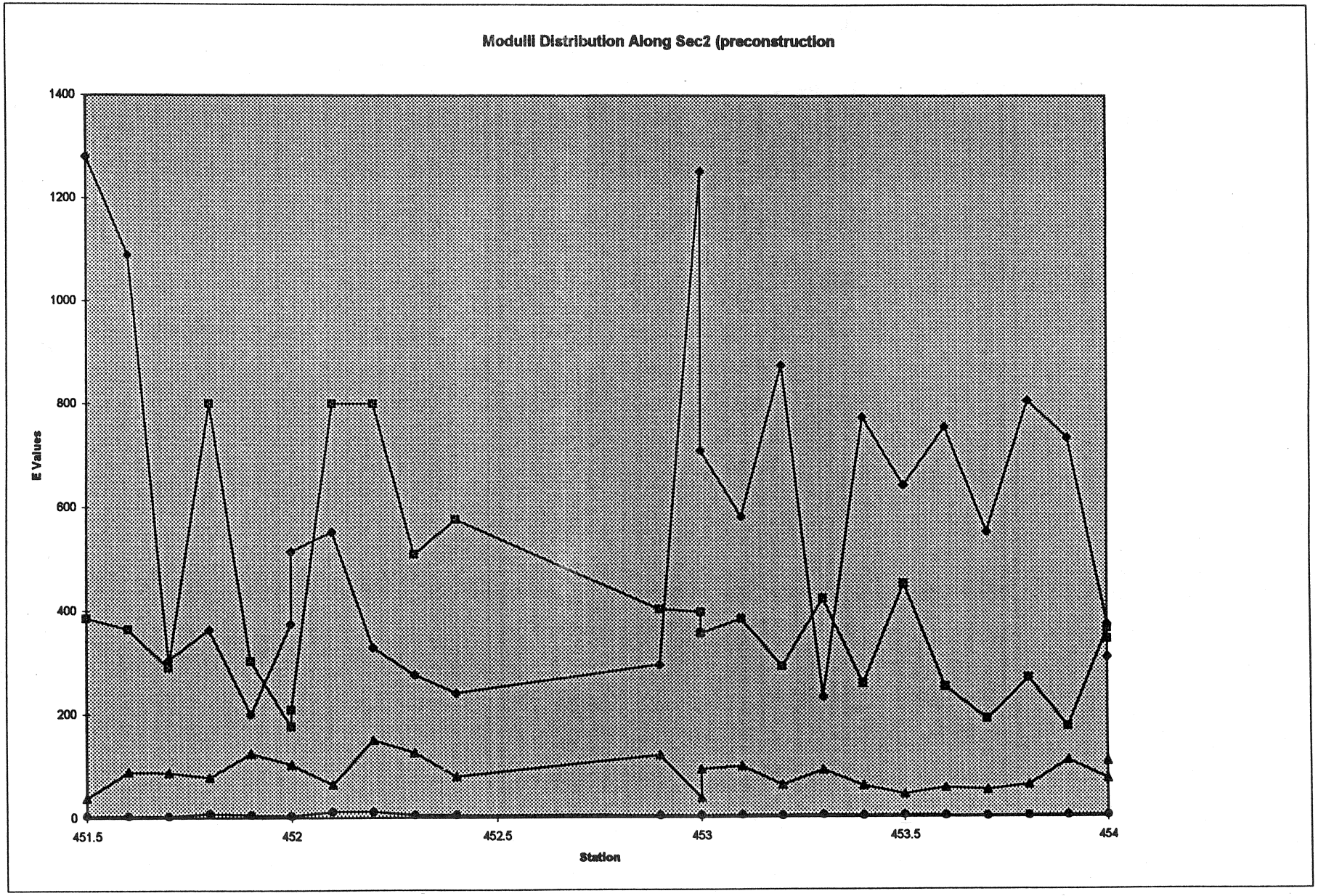
TTI MODULU ANALYSI SYSTEM (SUMMAR REPORT) (Version 4.2)

District: 5
Temp.: 95
Highway/Road: US030

	Thickness(in)		MODULI Minimum	RANGE(psi) Maximum	Poisson Ratio Values
Pavement:	H1:	5.2	200,000	2,000,000	0.35
Base:	H2:	3.6	40,000	800,000	0.35
Subbase:	H3:	10.8	10,000	150,000	0.45
Subgrade:		53.4	10,000	H4:	0.45

Station	Load (lbs)	Measured Deflection (mils): R1	R2	R3	R4	R5	R6	R7	Calculated Moduli values (ksi): SURF(E1)	BASE(E2)	SUBB(E3)	SUBG(E4)	ERR/Sens	Absolute Dpth to Bedrock
451.5	11,488	13.96	11.03	8.88	6.26	4.15	2.17	0.94	1281	385.5	37.9	4.3	4.58	71.03
451.601	11,436	11.42	9.22	8.03	6.41	5.22	3.39	1.81	1090	363.2	88.8	3.6	12.58	72.97
451.7	11,388	17.31	13.26	10.65	7.6	5.53	3	0.97	304	289.3	86.8	2.9	5.03	70.48
451.8	11,444	11.13	7.69	5.66	3.44	2.18	1.03	0.34	363	800	77.5	8	3.03	65.46
451.902	11,412	14.55	9.46	7.13	4.74	3.22	1.81	0.93	200	302	123.5	5	1.93	74.36
452	8,099	11.24	8.01	6.1	4.25	3.18	1.99	1.16	374	176.8	103.4	3.4	1.98	82.69
452	11,432	14.85	10.68	8.22	5.98	4.57	2.89	1.72	515	208.6	101.9	3.4	2.83	81.57
452.1	11,571	9.1	6.22	4.51	2.57	1.39	0.68	0.37	553	800	64	11.7	2.73	65.2
452.2	11,400	8.31	5.27	3.86	2.34	1.49	0.72	0.36	328	800	150	11.4	2.86	62.7
452.3	11,388	12.78	8.85	6.89	4.5	3.18	1.85	1.05	276	508.9	125.4	5.1	2.35	77.28
452.401	11,384	14.31	9.68	7.21	4.7	3.11	1.39	0.64	241	575.7	79.7	5.8	4.64	65.08
452.9	11,368	13.93	9.95	7.81	5.42	3.91	2.3	1.2	295	402.2	120.6	4	2.32	76.96
453	7,960	9.99	7.65	6.14	4.24	2.95	1.72	0.82	1253	397.1	37.1	4.2	3.26	75.82
453	11,309	13.15	10.13	8.24	5.9	4.24	2.55	1.27	709	355	92.9	3.5	2.95	75.26
453.1	11,396	12.35	9.47	7.04	4.87	3.62	2.09	0.96	581	383.9	98.7	4.5	2.14	70.7
453.2	11,273	15.37	12.62	10.52	7.66	5.14	3.09	1.34	875	291.6	62.3	2.9	4.58	74.36
453.3	11,293	15.87	11.17	8.38	5.57	3.87	2.19	1.02	232	422	91.3	4.2	1.88	74.97
453.4	11,253	17.22	13.69	11.14	8.16	6.07	3.67	1.67	773	257.7	60.5	2.6	3.18	75.4
453.5	11,372	14.85	11.29	8.76	5.63	3.65	2.1	0.87	641	451.6	44.5	4.5	1.57	74.15
453.6	11,233	17.71	14.14	11.78	8.78	6.22	4.15	2.3	753	251	56.8	2.5	5.01	83.12
453.702	11,186	22.55	17.06	13.87	10.54	7.91	5.05	2.7	552	189.5	52.5	1.9	2.57	82.1
453.804	11,452	15.43	12.99	11.08	8.57	6.7	4.21	2.09	805	268.2	62.3	2.7	10.1	75.82
453.901	11,269	12.93	9.76	7.57	5.25	3.89	2.57	1.72	733	175.7	110.6	3.7	1.58	92.12
454	8,107	11.57	8.52	6.69	4.5	3.15	1.84	1.22	373	364.4	74.5	3.6	2.29	80.68
454	11,392	15.08	10.76	8.54	5.97	4.27	2.59	1.63	309	343.8	108.4	3.6	2.12	82.05
							The 87.5% value	**=**	**276**	**208.6**	**62.5**	**2.7**		
Mean:		13.32	9.98	7.87	5.5	3.92	2.3	1.17	727	402.6	82.7	4.8	3.62	73.04
Std. Dev:		3.21	2.64	2.31	1.93	1.53	1.06	0.59	497	197.6	31.1	2.4	2.41	6.58
Var Coeff(%):		24.08	26.51	29.35	35	39.14	46.02	50.3	68	49.1	37.6	50.3	66.67	9.01

SEC2PRE

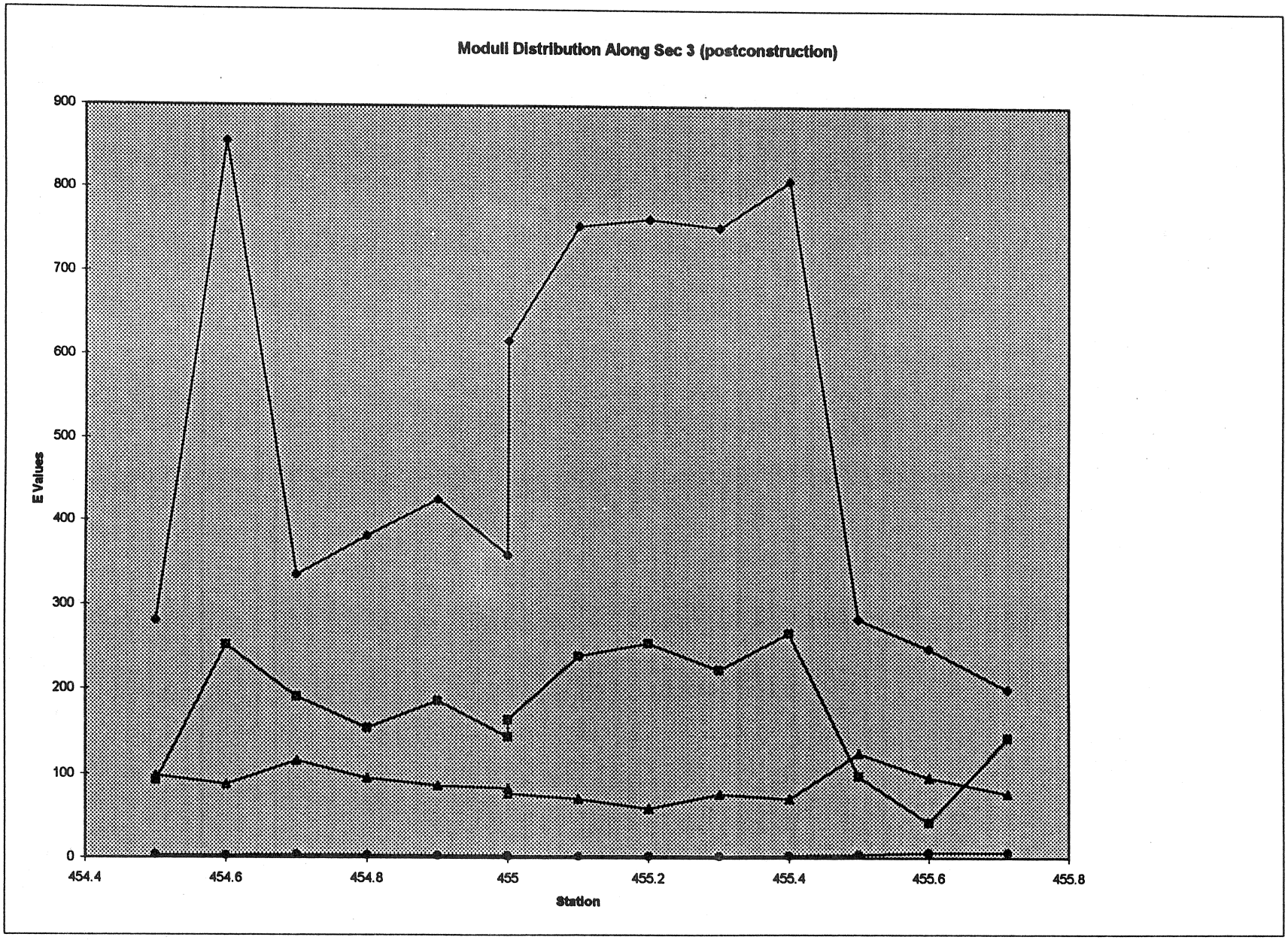

Modulii Distribution Along Sec2 (preconstruction
1400
1200
1000
800
600
400
200
0
E Values
451.5
452
452.5
453
453.5
454
Station

TTI MODULU ANALYSI SYSTEM (SUMMAR REPORT) (Version 4.2)

District: 5
Temp. : 107
Highway/Road: US030

		Thickness(in)	MODULI Minimum	RANGE(psi) Maximum	Poisson Ratio Values
Pavement:	H1:	5.2	200,000	2,000,000	0.35
Base:	H2:	3.6	40,000	800,000	0.35
Subbase:	H3:	10.8	10,000	150,000	0.45
Subgrade:	H4:	61.6	10,000		0.45

Station	Load (lbs)	Measured Deflection (mils): R1	R2	R3	R4	R5	R6	R7	Calculated Moduli values (ksi): SURF(E1)	BASE(E2)	SUBB(E3)	SUBG(E4)	ERR/Sens	Absolute Dpth to Bedrock
454.5	11,901	21.48	13.67	10.51	7.53	5.84	3.84	2.38	281	92.4	97.8	3.3	4.59	90.11
454.6	11,952	16.89	12.19	10.15	7.8	6.09	4.33	2.56	857	252.1	87.7	2.9	4.17	82.78
454.7	12,135	16.75	11.78	9.15	6.62	4.85	3.19	2.07	336	190.6	116.2	3.9	1.39	90.84
454.8	12,139	19.07	13.76	10.83	7.59	5.73	4.16	2.14	382	154.5	95.2	3.2	3.07	79.51
454.9	12,068	19.54	14.35	11.24	8.46	6.43	4.28	2.34	427	186.1	86.3	2.9	2.15	78.92
455	9,303	16.37	11.71	9.26	6.65	5.1	3.52	2.05	360	144.2	83.7	2.8	2.96	86.52
455	12,592	20.93	15.7	12.6	9.28	7.13	5.07	2.91	618	164.2	77.4	2.6	2.59	84.31
455.1	11,917	19.36	14.83	11.87	9.22	7.27	5.14	2.97	756	239.5	70.6	2.5	3.87	81.14
455.2	11,929	19.1	14.97	12.78	9.92	7.86	5.89	2.8	765	254.9	59.2	2.5	7.96	76.25
455.3	11,901	19.06	14.22	11.91	7.96	7.1	5.26	3.44	755	223.2	76.7	2.6	7.03	300
455.4	12,087	18.45	14.9	11.74	8.29	6.74	4.8	2.95	811	267.2	70.7	2.7	3.07	300
455.5	11,678	17.68	11.24	8.2	5.91	4.63	3.11	1.88	284	98	125.2	4.2	5.49	82.38
455.6	11,543	19.15	11.54	7.72	4.67	3.11	1.78	0.96	249	42.3	96	6.1	2.14	77.11
455.712	10,165	15.57	9.72	6.87	4.23	2.89	1.41	0.62	200	143.2	77	6.3	3.56	69.2
							The 87.5% values =		**269**	**95.9**	**70.6625**	**2.5625**		
Mean:		18.53	13.18	10.35	7.44	5.77	3.98	2.29	506	175.2	87.1	3.5	3.86	81.16
Std. Dev:		1.7	1.79	1.86	1.68	1.51	1.29	0.77	240	68.2	18	1.3	1.88	23.94
Var Coeff(%):		9.16	13.6	17.99	22.53	26.19	32.5	33.82	48	39	20.6	36.8	48.7	29.5


Moduli Distribution Along Sec 3 (postconstruction)
E Values
900
800
700
600
500
400
300
200
100
0
454.4
454.6
454.8
455
455.2
455.4
455.6
455.8
Station